

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

HYDRO-PHOTON, INC.,
a Maine Corporation

Plaintiff,

v.

MERIDIAN DESIGN, INC., a California
Corporation

Defendant.

Civil Action No. 05-11240 GAO

**DECLARATION OF MILES MAIDEN IN SUPPORT OF HYDRO-PHOTON, INC.'S
CROSS MOTION FOR PARTIAL SUMMARY JUDGMENT OF INFRINGEMENT**

I, Miles Maiden, declare, under the penalty of perjury, that the following statements are true, or where indicated to be based on a belief, are believed to be true to the best of my knowledge, information and belief:

1. I am the CEO and founder of Hydro-Photon, Inc. ("HPI").
2. I have personally examined and operated Meridian Design, Inc.'s AquaStar product. ("AquaStar").
3. The AquaStar is of a size permitting it to be easily held in the hands of a human user.
4. The AquaStar includes a polycarbonate bottle having an open, threaded end. The bottle can hold water, and water can be drunk from the open end of the bottle.
5. The AquaStar includes a control head or case with a screw-on cap extension that can be screwed onto the open, threaded end of the polycarbonate bottle. An ultraviolet lamp extends from one end of the case so that, when the case is screwed onto the bottle, and the bottle is nearly full with water, the ultraviolet lamp is fully submerged in the water.

6. The case of the AquaStar also includes a battery compartment which contains batteries that serve as a source of power for the ultraviolet lamp. The case further includes a button accessible to the user from outside the case to turn the ultraviolet lamp on and off.

7. I disassembled the case of the AquaStar and found that the on-off button mechanically connects inside the case to the contacts of a switch that is used in turning the ultraviolet lamp on and off. Through the switch a signal is provided to a microcontroller that controls the voltage supplied to the gate of a field effect transistor. The gate of the field effect transistor opens and closes such that the transistor operates as a switch, to control the supply of power to the lamp.

8. I have also reviewed Meridian's web-site, and manuals distributed by Meridian with the AquaStar and AquaStar Plus! (the "Accused Products").

9. Representations made on Meridian's web-site and in the manuals distributed with the Accused Products state, expressly and by implication, that the Accused Products have a liquid level sensor.

10. Meridian's web-site at http://uvaquastar.com/info_pages.php/pages_id/25 under "Frequently Asked Questions" makes the following representation:

1) Why doesn't my AquaStar work?

Here are some troubleshooting tips:

- Make sure the **gold probe** in the cap is immersed in the water. This grounds the tube environment and greatly facilitates striking (lighting) the tube.
(A copy of the relevant web pages is attached hereto as Exhibit 1).

11. Meridian's web site at http://uvaquastar.com/info_pages.php/pages_id/26 under "Rarely Asked Questions" makes the following representation:

3) Can I cure UV glues? Erase EPROMs? Test synthetic diamonds with the AquaStar™ UV Portable Water Purifier?

Yes, the AquaStar™ UV Portable Water Purifier can do all these things, but you will want to run a piece of copper or other conductive tape along the length of the tube and contacting the **gold water probe** if you wish to run the unit 'dry'. As always, be very careful not to expose your skin and, especially, your eyes to direct UV-C.

(A copy of the relevant web pages is attached hereto as Exhibit 2).

12. The AquaStar Plus! User Guide makes the following representations, under the heading "Using the AquaStar Plus!":

1. Fill the bottle with water to between 300ml and 1L, then place the cap on the bottle and hold the bottle, upside down if necessary, **so the water touches the gold pin in the cap.**

and under the heading "Tips":

If the tube is not lighting, it is possible the water level is too low – **not covering the gold pin** at the top -

(A copy of the relevant pages from the AquaStar Plus! User Guide is attached hereto as Exhibit 3).

13. The AquaStar User Guide makes the following representations, under the heading "Using the AquaStar Ultraviolet (UV-C) Portable Water Purifier":

1. Fill the bottle with clear water, **covering the gold pin near the top of the light tube.**

and under the heading "Tips":

If the tube is not lighting, it is possible the water level is too low – **not covering the gold pin** at the top -

(A copy of the relevant pages from the AquaStar User Manuel is attached hereto as Exhibit 4).

Dated: November 28, 2005



Miles Maiden

EXHIBIT 1

Friday 05 August, 2005

AquaStar

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Dollar (US)

**FAQ****Frequently Asked Questions****1) Why doesn't my AquaStar work?**

Here are some troubleshooting tips:

- Make sure the gold probe in the cap is immersed in the water. This grounds the tube environment and greatly facilitates striking (lighting) the tube.
- If nothing happens when you press the button, first check for proper battery insertion. You should try a full system reset by removing the battery cover, holding the button down for 2 seconds to discharge the circuit then try replacing the cap. On system reset the red light will blink for 5 seconds and then allow normal functioning.
- Warming water up above 10°C will also aid in striking and provides better UV dosing (maximum UV output is at ~32°C)

2) Can the AquaStar™ UV Portable Water Purifier cap be used with a different 1L bottle?

The AquaStar™ UV Portable Water Purifier will fit any of the commonly available Nalgene®-style wide mouth 1L (or larger) bottles, including soft white HDPE, LDPE and polycarbonate bottles. With this in mind, here are some things to consider:

- It is recommended that the AquaStar™ be stored in a rigid-style bottle (not a collapsible "canteen" bottle), as rigid bottles offer the best protection for the UV tube. Polycarbonate bottles are the most rigid, and best performing, bottles available for this purpose, and they don't impart a plastic aftertaste to the water like the softer plastic bottles do. The AquaStar™ ships with a high-quality Nalgene®-style polycarbonate bottle.
- For storage purposes, the length of the bottle must accommodate the tube. Common 16 ounce (.5L) bottles are generally too short for this purpose. The AquaStar™ **can** be used outside of the 1L bottle, provided the tube is fully immersed in water, or enclosed in some sort of container (plastic, glass, metal, etc.) to provide protection from UV-C sunburn the tube can create.
- When using a larger bottle (more than 1L), or treating a quantity of water larger than 1L, make sure to dose the water multiple times. For example, any amount more than 1L but less than 2L gets two doses (to be safe); more than 2L but less than 3L gets 3 doses, and so on.

3) What are "CR123" batteries, and where can I buy them cheaply?

CR123A batteries are half the length, and a bit wider, than AA batteries. They also supply 3 volts each at over 1100 mAh. By using the more compact 123-type batteries, the weight and size of the AquaStar™ is minimized while maintaining a long run time and high performance. Since the AquaStar™ runs off of 6 volts DC, you'd need 4 of the AA batteries to power it, adding a lot more bulk and weight. And, in case you wondered, a pack of 4 AA high-output batteries costs about the same as a pair of 123-type batteries.

You'll find 123-type batteries anywhere photo film is sold. We also sell them online.

4) Can the AquaStar™ UV Portable Water Purifier be powered with anything other than a pair of 123-type batteries?

Yes. Our new auxiliary power module will allow the AquaStar to run off of wall transformers, cigarette

lighter adapters, external battery packs, solar panels, hand-crank generators, and more.

Since the AquaStar™ control electronics package is plastic-molded into the cap and designed specifically for "123" consumer photo batteries, you must use this type of battery if you choose to run the AquaStar on internal power. These batteries are typically labeled CR123A, EL-123, DL123, PL-123, or some other variation depending on the maker. For example, Duracell uses "DL" for "Duracell Lithium" and Eveready uses "EL" for "Eveready Lithium." Pretty much any 123-type will work.

5) Why does my AquaStar™ UV Portable Water Purifier sometimes fail to operate in ice water?

The AquaStar™ UV Portable Water Purifier is designed to shut off if the water is too cold to effectively dose. Below 35°F (2°C), the UV tube becomes very inefficient at generating UV-C. Warm the water up above 40°F (4°C) and try again.

6) Can I replace the tube if it breaks?

The G4T5 UV tube is not field-replaceable. The tube is sealed in at both ends. Return to Meridian Design, Inc., for replacement.

7) Isn't it dangerous to look at the tube operating in the bottle?

No, you are only seeing the blue light. The UV-C is completely blocked by any of the polymers which 1L bottles are made from.

8) What happens if it freezes?

Well, frozen water can rupture the bottle, tube or both, but most people know this risk. What is less well known is that deep freezing the batteries is bad for them. We recommend keeping the bottle inside your tent or even sleeping bag if it is very cold, using a portable hand warmer inserted into a bottle carrier to keep the unit and water above freezing or just removing the batteries and keeping them in a pocket next to your body (probably the easiest thing). The new folding handle top screws make this easier and warmer batteries perform better supplying power as well.

9) What about dirt?

Most sediments can simply be allowed to settle out and then be decanted off; the remainder (fine sediment and silt) is unlikely to adversely affect the unit:

EPA Document # 815-D-03-007, page G-1, pdf page 394 "Typically, the turbidity in unfiltered surface waters is less than 1 nephelometric turbidity units (NTU)."

EPA Document # 815-D-03-007, page 2-11, pdf page 45 "For unfiltered waters, Passantino and Malley (2001) found that source water turbidity up to 10 NTU does not impact the UV dose-response of separately added (seeded) microorganisms."

10) What are the full product specifications of the AquaStar™ UV Portable Water Purifier?

[For full product specifications, click here.](#)

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EXHIBIT 2



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RAQ

Rarely Asked Questions

1) How can I get rid of the silver-black discoloration at the top of the tube?

This deposit forms normally after much use. It does not affect tube performance, but can be mostly flashed off using a butane lighter to heat the side of the glass tube, if the esthetics bother you. *Note: If you attempt this, be careful not to melt the plastics or the protective sleeve of the guide wire. This procedure may void your warranty.*

2) Can I generate ozone with the AquaStar™ UV Portable Water Purifier?

No, the *AquaStar™ UV Portable Water Purifier* uses a special glass tube which thermally insulates better than quartz, yet does not pass the very short 188nm radiation that generates ozone.

3) Can I cure UV glues? Erase EPROMs? Test synthetic diamonds with the AquaStar™ UV Portable Water Purifier?

Yes, the *AquaStar™ UV Portable Water Purifier* can do all these things, but you will want to run a piece of copper or other conductive tape along the length of the tube and contacting the gold water probe if you wish to run the unit 'dry'. As always, be very careful not to expose your skin and, especially, your eyes to direct UV-C.

4) Can the *AquaStar™ UV Portable Water Purifier* be used as a disinfecting wand to destroy biological spores such as anthrax?

This also falls into the realm of "possible" but not recommended. Besides generating potentially hazardous, unshielded radiation, the *AquaStar™ UV Portable Water Purifier* works line-of-sight. So any bugs hiding in cracks and crevices will tend to be missed.

5) Is extended battery storage in the unit a problem?

No, the power down current is under 5uAmps, so it would take over 30 years to kill the pair of CR123 batteries at this discharge rate.

6) What's the difference between polycarbonate plastic bottles and LEXAN® bottles?

LEXAN® is a registered trademark and brandname of General Electric Company that refers to a particular type of polycarbonate plastic resin invented in 1953. Manufacturers often use the terms LEXAN® and polycarbonate plastic interchangeably because they are functionally equivalent for most consumer applications, though only products made from GE's LEXAN® plastic may carry the brandname. The same type of material used in astronaut helmets, bullet-proof glass, and automobile headlight assemblies is used in your AquaStar™!

7) Will it purify distilled water or reverse osmosis filtered water?

Yes and No. It is difficult to strike the tube in water that has no mineral content as water in this 'artificial' state is non-conductive. It begs the question why one would want to purify already ultra-pure water, but we got asked. One of those problems that no one really has.

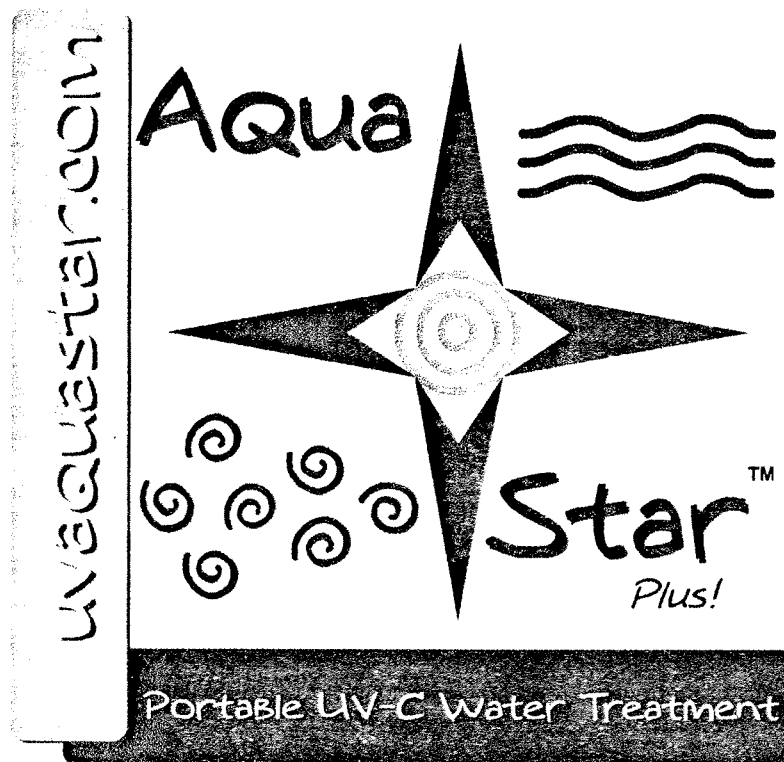
8) Does the tube contain mercury?

Yes, as does every fluorescent tube. However it is a very small amount: 5 milligrams. Less than is found in a typical farm raised salmon. If the tube breaks, don't inhale the mercury vapor deeply or lick the quartz casing for stray bits of mercury; other than that, you'll be fine.

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EXHIBIT 3



User's Guide

Congratulations!

Thank you for purchasing the AquaStar *Plus!*™ Ultraviolet (UV-C) Portable Water Treatment System by Meridian Design, Inc. Our products are designed with the highest quality components to ensure years of trouble-free service in a variety of environments.

The AquaStar *Plus!* is a ultraviolet water treatment solution appropriate for use in all climates and settings. Campers, hikers, emergency crews, and families who depend on having clean water, will benefit from AquaStar *Plus!*.

AquaStar *Plus!* now has a new "Lantern Mode". It contains a handy separate low power, white LED for lighting. Simply click twice on the button to get a timed period of 15 minutes of bright white light.

Using a pair of international standard CR123 batteries, the AquaStar *Plus!* can quickly treat a liter of water in 60 seconds, and provide over 70 liters, or 18.5 gallons, of clean water on a single set of batteries. Lightweight, rugged and simple to operate, AquaStar *Plus!* is the ideal water solution for everyone's survival kit.

Before using your AquaStar *Plus!* for the first time, we recommend reading the next section of this manual, Using the AquaStar *Plus!*™, to familiarize yourself with the unit.

- *UV-C light can cause irritation to the eyes and skin if exposure is above safe levels.* The UV-C light is absorbed by the plastic bottle and is therefore entirely safe when operated as intended. If the light is ever turned on outside of the bottle, the user should simply turn it off by pressing the button again, or put it back into the bottle.
- *Keep away from children*
- The AquaStar *Plus!* bottle provides 100% shielding of any UV-C light
- Please wash your AquaStar *Plus!* with a mild detergent and water prior to first use. Clean it and store it in a dry environment when not in use.

Thanks!

-- Team AquaStar

About Us

Meridian Design, Incorporated, was founded in 1986 as an engineering company that specialized in turnkey embedded control solutions. Meridian Design has developed products in fields as diverse as fiberoptic transceiver modules, LED flashlights, kitchen composters, laboratory test equipment, shape memory muscle actuators, avionics, microscopy, medical centrifuges, model train electronics, and pulse detonation wave engine controllers.

The AquaStar™ UV Portable Water Treatment System was the first directly marketed product offered by Meridian Design. A low-cost solar-powered version of the AquaStar *Plus!*™ is also being developed for use in impoverished areas of the world where water-borne illness ends the lives of over two million people each year.

For more information about us, our products, or the latest Frequently Asked Questions (FAQ) and Rarely Asked Questions (RAQ),

Visit our website:

www.uvaquaastar.com

Write us:

shop@uvaquaastar.com

Meridian Design, Incorporated
2033 San Elijo Avenue
Suite #511
Cardiff, CA 92007

Or Call:

(760) 494-0696, 9 am - 5 pm, Pacific Time

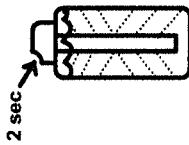
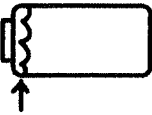
Meridian Design, Incorporated
EPA Est. 82431-CO-001

AquaStar *Plus!*™ User's Guide
Revision 20050809

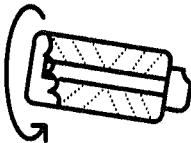
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Using the AquaStar Plus!™

1. Fill the bottle with water to between 300ml and 1L, then place the cap on the bottle and hold the bottle, upside down if necessary, so the water touches the gold pin in the cap. If the water is cloudy, the UV-C will penetrate the water less. In this case we recommend pre-filtering the water until it is clear, agitating the water so that more of it comes into closer contact with the lamp, and/or running the water through more than one cycle to assure complete disinfection.



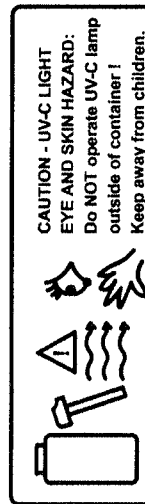
2. To start cleaning cycle, press and hold the button for about two seconds and release. The tube will light and glow blue and the LED in the cap will glow orange while the cleaning cycle runs.



3. Swirl or agitate the bottle during the cleaning cycle to improve the disinfection process (upside down works slightly better). The water directly under the lamp is partially shaded from the cleansing light, so agitating the water somewhat assures a complete treatment.

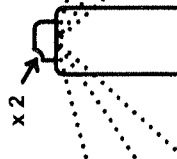


4. The cleaning cycle will run for about 80 seconds. The blue UV-C lamp will turn off and the green LED in the cap will blink when the disinfection cycle has finished. A red LED indicates an error and the cycle may not have completed (see "Tips" and "FAQ" for more information)



Lantern Mode

AquaStar Plus! contains a handy separate low-power, white LED for lighting. (LED light does not clean water, and is safe to use out of the bottle)



The light is self timed and will go dim in 14 minutes, and will go off a minute later. Clicking the button when the light is in dim mode will return it to bright mode for 15 more minutes. Each 15 minute cycle of white LED light uses approximately 1/100 of the battery capacity.

Frequently Asked Questions (FAQ)

1. How do I replace the batteries?

Loosen the two screws in the cap until the battery compartment lifts away. Insert a fresh pair of batteries, noting the polarity printed on the cap. Before replacing the cap, hold the button down for 2 seconds to reset the control circuitry. Replace the cap and tighten the screws until they are snug. Do NOT over tighten the screws, snug is sufficient to seal the battery compartment.

2. Can the AquaStar Plus! cap be used with a different 1L bottle?

Yes. AquaStar Plus! fits most Nalgene®-style wide mouth 1L (or larger) bottles. Use a rigid-style bottle (not a collapsible "canteen") to protect the UV-C tube. Your AquaStar Plus! ships with a high-quality lightweight odorless Nalgene®-style polycarbonate bottle, the best kind, that imparts no plastic aftertaste to the water. When using a larger bottle (more than 1L), or treating a quantity of water larger than 1L, make sure to dose the water multiple times. For example, any amount more than 1L but less than 2L gets two doses (to be safe); more than 2L but less than 3L gets 3 doses, and so on.

3. Can the AquaStar Plus! use external power sources?

Yes. A drop-in accessory module for your AquaStar Plus! allows the use of an external battery pack, cigarette lighter adapter, solar panel, wall transformer, and more! Check our website for details.

4. Can I replace the tube if it breaks?

No. The G4T5 UV tube is not field-replaceable. The tube is sealed in ABS plastic at both ends. Return to Meridian Design, Inc., for replacement. (See our warranty / repair information at the end of this manual.)

Tips

- To turn off the UV-C tube immediately and abort the cleaning cycle, press the button on the cap.
- If the LED in the cap blinks or glows red, the cycle was interrupted. This could be due to low batteries, an impact to the bottle, or a loose battery cover. Re-run cycle to ensure water is thoroughly treated.
- When the bright white spot at the top of the tube turns a dimmer orange, the batteries are getting low, you will have about 5 cleaning cycles left at this point. When the batteries are too low for a complete cleaning cycle, the cap will flash red and abort the cycle.
- The AquaStar Plus! is may shut off if the water is too cold. Below 35°F (2°C), the UV tube becomes less efficient at generating UV-C. Warm the water up above 40°F (4°C) and try again.
- If the tube is not lighting, it is possible the water level is too low -- not covering the gold pin at the top -- or the water is too cold -- below 35°F (2°C). Try holding the button on the cap a bit longer to force the cleaning cycle to start. If the tube still doesn't light, the batteries may need replacing, or the unit needs a system reset. See the FAQ for details.
- A system reset should never be needed, but if necessary can be achieved. Remove the battery cap, hold the button down for 2 seconds to discharge the control circuit, and then replace the cap. On system reset, the red light in the cap will blink for 5 seconds and then allow normal functioning.

AquaStar Plus! Specifications

Weight

- Loaded (as shipped, with batteries and bottle attached): 8.5 ounces (240 grams)

Dimensions

- Control Head (external): 0.75" h x 3.2" w (19 mm x 81 mm)
- Control Head + Tube: 7.75" long (19.6 cm)
- Displacement Volume (in full bottle): 2.6 ounces (78 mL)

Components

- Batteries: 2 x Type 123 (DL123A, CR123A, EL123A, PL123A or similar), 3Volt Photo Battery. These batteries are available wherever film is sold, and cost as little as \$1.25 per battery online (or in stores for a few dollars each). Life expectancy = 70 cycles (70 liters, or 18.5 gallons, of water)
- UV-C Tube: Philips TUV4T5 Germicidal 4W UV-C (254 nm) Sterilamp®, hot-cathode, low-voltage. Rated useful life (to 85% efficiency) = 6,000 hours. Expected life as used in AquaStar Plus! (driven at 6W, producing 0.8W UV-C at 20 ° C) = 2,000 hours
- Bottle: Polycarbonate plastic (equivalent to LEXAN® brand), 32 ounce (1L) wide-mouth
- White LED: 1/2W high efficiency solid state lamp

Dosage and Efficacy

- Dosage Time: 80 seconds per liter (1 cycle). Below 50 ° F (10 ° C), dosage time should be doubled (2 cycles per liter)
- UV-C light is very good at killing pathogens. Filters can have a weakness in that many pathogens, especially the smaller viruses, are too small to filter effectively. Some pathogens, such as Cryptosporidium, can be hard to kill with chemicals because of their tough spore shell. When used as directed UV-C light is very effective against pathogens.
- When water quality is bad, such as unclear water or when storing water for longer periods of time, combinations of methods can work best.
- See www.uvaquastar.com for testing and other efficacy details.

Limited Two Year Warranty / Repair information

Your AquaStar Plus!™ UV Portable Water Treatment System (the "Product") is warranted by Meridian-Design, Inc. to be free from defective materials or workmanship for a period of two years from the date of purchase. Meridian-Design, Inc., will either repair or replace (at our option) free of charge, any parts necessary to correct defects in materials or workmanship. Should repair be needed within the warranty period, ship the Product prepaid, insured, and attached to a 1L bottle, together with \$10.00 U.S. for return shipping and handling, and a copy of your original sales receipt, to:

**Meridian-Design, Inc.
ATTN: Service Dept
2033 San Elijo Avenue
Suite #511
Cardiff, CA 92007**

(For those outside of the U.S., please contact us for international shipping charges).

Be sure to include your name, address and phone number with your AquaStar Plus!™. This warranty excludes normal wear and tear, tube glass breakage, and improper use. In no event shall Meridian-Design, Inc., be liable, or in any way responsible, for any damages or defects in the Product caused by third-party repairs or modifications.

No-Hassle Lifetime Replacement Policy

Accidents happen! Rather than throw away your damaged AquaStar Plus!™, we offer a simple lifetime replacement policy. Send us your broken AquaStar Plus!™, together with \$30 U.S. to cover our repair costs and return shipping, and we'll send you a new or rebuilt unit in exchange. (Note: The repair and shipping fee is valid through 2005, and may be adjusted annually for inflation. In any case, we'll always make sure you have a working AquaStar Plus!™ for less than half the cost of a new replacement unit.)

EXHIBIT 4

About Us

Meridian Design, Incorporated, was founded in 1986 as an engineering company that specialized in turnkey embedded control solutions. Meridian Design has developed products in fields as diverse as fiberoptic transceiver modules, LED flashlights, kitchen composters, laboratory test equipment, shape memory muscle actuators, avionics, microscopy, medical centrifuges, model train electronics, and pulse detonation wave engine controllers.

The AquaStar™ UV Portable Water Purifier is the first directly marketed product offered by Meridian Design. A low-cost solar-powered version of the AquaStar™ UV Portable Water Purifier is also being developed for use in impoverished areas of the world where water-borne illness ends the lives of over two million people each year.

For more information about us, our products, or the latest Frequently Asked Questions (FAQ) and Rarely Asked Questions (RAQ),

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www.uvaquastar.com

Write us:

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Or Call:

(760) 494-0696, 9 am – 5 pm, Pacific Time



User Manual

Version 20041229

HP0515

Congratulations!

Thank you for purchasing the AquaStar™ Ultraviolet (UV-C) Portable Water Purifier by Meridian Design, Inc. Our products are designed with the highest quality components to ensure years of trouble-free service in a variety of environments.

The AquaStar is a spectraceutical treatment solution appropriate for use in all climates and settings. Campers, hikers, emergency crews, and families who depend on having clean water, depend on AquaStar.

Using a pair of international standard CR123 batteries, the AquaStar can safely and quickly treat a liter of water in 60 seconds, and provide over 70 liters, or 18.5 gallons, of clean water on a single set of batteries. Lightweight, rugged and simple to operate, AquaStar is the ideal water solution for everyone's survival kit.

Before using your AquaStar for the first time, we recommend reading the next section of this manual, Using the AquaStar™ Ultraviolet (UV-C) Portable Water Purifier, to familiarize yourself with the purifier.

While the AquaStar is simple to operate, there are some things you should know about ultraviolet UV-C light and how to safely use this light to purify your water.

- *Never expose the unshielded AquaStar light tube to your skin or eyes while it is running.* Like other types of UV light, UV-C damages living tissue. Prolonged exposure to UV-C will damage living cells irreparably.
- The AquaStar bottle provides 100% shielding of any UV-C light that could damage living tissue. In fact, most containers will shield UV-C, with the exceptions of quartz and certain types of Teflon® materials. So remember, when running your AquaStar, keep the light tube inside a container.

Thanks!

-- Team AquaStar

AquaStar™ User Manual
Revision 20041229

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AquaStar Specifications

Weight

- Empty (control head, UV-C tube, battery cap attached): 2 ounces (56 grams)
- Loaded (as shipped, with batteries and bottle attached): 8.5 ounces (240 grams)
- Spare Batteries (per pair): 1.1 ounce (31 grams)
- Polycarbonate 1L Bottle: 4.75 ounces (136 grams)

Dimensions

- Control Head (external): 0.75" h x 3.2" w (19 mm x 81 mm)
- Control Head + Tube: 7.75" long (19.6 cm)
- Including 1L Polycarbonate Bottle (As shipped): 8.75" h x 3.5" w (22.2 cm x 9 cm)
- Displacement Volume (in full bottle): 2.6 ounces (78 mL)

Components

- Batteries: 2 x Type 123 (DL123A, CR123A, EL123A, PL123A or similar), 3Volt Photo Battery. These batteries are available at most drug stores and supermarkets, and cost as little as \$1.25 per battery online (or in stores for a few dollars each). Life expectancy = 70 cycles (70 liters, or 18.5 gallons, of water).
- UV-C Tube: Philips TUV4T5 Germicidal 4W UV-C (254 nm) Sterilamp®, hot-cathode, low-voltage. Rated useful life (to 85% efficiency) = 6,000 hours. Expected life as used in AquaStar (driven at 6W, producing 0.8W UV-C at 20 ° C) = 2,000 hours.
- Bottle: Polycarbonate plastic (equivalent to LEXAN® brand), 32 ounce (1L) wide-mouth.

Dosage and Efficacy

- Dosage Time: 60 seconds per liter (1 cycle). Below 50 ° F (10 ° C), dosage time should be doubled (2 cycles per liter)
- >99.99% effective against protozoa (including Giardia, Entamoeba Dysentery, and Cryptosporidium)
- >99.99% effective against bacteria (including Cholera, Shigella, Salmonella, and E. coli)
- >99.9% effective against viruses (including Enterovirus, Rotavirus, Hepatitis, and Poliovirus)
- Exceeds NSF/ANSI 55-2004 guidelines for Ultraviolet Microbiological Water Treatment Systems both class A and class B, for safe drinking water

Limited Two Year Warranty / Repair information

Your AquaStar™ UV Portable Water Purifier (the "Product") is warranted by Meridian-Design, Inc. to be free from defective materials or workmanship for a period of two years from the date of purchase. Meridian-Design, Inc., will either repair or replace (at our option) free of charge, any parts necessary to correct defects in materials or workmanship. Should repair be needed within the warranty period, ship the Product prepaid, insured, and attached to a 1L bottle, together with \$10.00 U.S. for return shipping and handling, and a copy of your original sales receipt, to:

**Meridian-Design, Inc.
ATTN: Service Dept
2845 Ore Mill Road Unit 3
Colorado Springs CO, 80904**

(For those outside of the U.S., please contact us for international shipping charges).

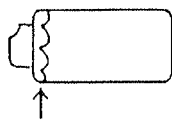
Be sure to include your name, address and phone number with your AquaStar™. This warranty excludes normal wear and tear, tube glass breakage, and improper use. In no event shall Meridian-Design, Inc., be liable, or in any way responsible, for any damages or defects in the Product caused by third-party repairs or modifications.

No-Hassle Lifetime Replacement Policy

Accidents happen! Rather than throw away your damaged AquaStar™, we offer a simple lifetime replacement policy. Send us your broken AquaStar™, together with \$30 U.S. to cover our repair costs and return shipping, and we'll send you a new or rebuilt unit in exchange. (Note: The repair and shipping fee is valid through 2005, and may be adjusted annually for inflation. In any case, we'll always make sure you have a working AquaStar™ for less than half the cost of a new replacement unit.)

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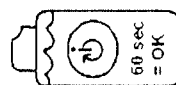
Using the AquaStar™ Ultraviolet (UV-C) Portable Water Purifier



1. Fill the bottle with clear water, covering the gold pin near the top of the light tube. (If the water is especially cloudy or murky, we recommend pre-filtering the water with a #1 coffee filter, handkerchief, bandana, or some other material. The water doesn't have to be "perfect" for AquaStar™ to make it safe.)

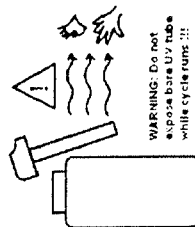


2. Place the cap on the bottle and hold the button on the cap for about a second to light the glass tube and start the cleaning cycle. The tube should glow blue, and the LED in the cap will glow orange while the cleaning cycle runs.



3. The cleaning cycle will run for one minute.

The LED in the cap will blink green to let you know when the cycle is finished and the water is safe to drink.



Never expose the unshielded AquaStar light tube to your skin or eyes while it is running. The AquaStar bottle provides 100% shielding of any UV-C light that could damage living tissue.

Tips

- To stop a cleaning cycle and turn off the UV-C tube immediately, press the button on the cap.
- If the LED in the cap blinks or glows red, the cycle was interrupted. Re-run cycle to ensure water is thoroughly treated.
- A low battery condition is indicated when the bright white spot at the top of the tube turns a dimmer orange.
- The AquaStar is designed to shut off if the water is too cold to effectively dose. Below 35°F (2°C), the UV tube becomes very inefficient at generating UV-C. Warm the water up above 40°F (4°C) and try again.
- If the tube is not lighting, it is possible the water level is too low -- not covering the gold pin at the top -- or the water is too cold -- below 35°F (2°C). Try holding the button on the cap a bit longer to force the cleaning cycle to start. If the tube still doesn't light, the batteries may need replacing.
- Most CR123A batteries will provide power for 70 cleaning cycles (70 liters, or 18.5 gallons of water). Pack a spare set of batteries if you plan on using more water than this.

Frequently Asked Questions

1. How do I replace the batteries?

Using a Phillips (cross point) screwdriver, unscrew the two steel screws in the cap until the battery compartment lifts away. Insert a fresh pair of batteries, noting the polarity printed on the cap. Replace the cap and tighten the screws until they are snug. Do not over tighten the screws (i.e., don't "torque" them down) -- snug is sufficient to seal the battery compartment.

2. Can the AquaStar cap be used with a different 1L bottle?

AquaStar will fit any of the commonly available Nalgene®-style wide mouth 1L (or larger) bottles, including soft white HDPE, LDPE and polycarbonate bottles. With this in mind, here are some things to consider:

- Use a rigid-style bottle (not a collapsible "canteen" bottle) to protect the UV-C tube. Polycarbonate bottles are best, and they don't impart a plastic aftertaste to the water like the softer plastic bottles do. Your AquaStar ships with a high-quality Nalgene®-style polycarbonate bottle.
- The bottle must accommodate the tube. Common 16 ounce (.5L) bottles are generally too short for this purpose. AquaStar can be used outside of the 1L bottle, provided the tube is fully immersed in water, or enclosed in some sort of container (plastic, glass, metal, etc.) to provide protection from UV-C.
- When using a larger bottle (more than 1L), or treating a quantity of water larger than 1L, make sure to dose the water multiple times. For example, any amount more than 1L but less than 2L gets two doses (to be safe); more than 2L but less than 3L gets 3 doses, and so on.

3. Can the AquaStar be powered with anything other than a pair of 123-type batteries?

Yes. A drop-in module for your AquaStar will allow the unit to run off an external pack of 4 AA batteries, an adapter for automobile cigarette lighters, solar panels, and more! Check our website for accessory prices and availability.

4. Can I replace the tube if it breaks?

No. The G4T5 UV tube is not field-replaceable. The tube is sealed in at both ends. Return to Meridian Design, Inc., for replacement. (See our warranty / repair information at the end of this manual.)

5. Isn't it dangerous to look at the tube operating in the bottle?

No, you are only seeing the blue light. The UV-C is completely blocked by any of the polymers which 1L bottles are made from.

6. Is extended battery storage in the unit a problem?

No, the power down current is under 5uAmps, so it would take over 30 years to kill the pair of CR123 batteries at this discharge rate.